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Effectiveness of Community-Based Hemorrhage Control Education

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DOCTOR OF NURSING PRACTICE PROGRAM

A DNP PROJECT

TITLE:

Effectiveness of Community-Based Hemorrhage Control Education

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Abstract

Background: Rural residents are 14% more likely to die from an injury than their urban counterparts due to untimely and ineffective prehospital treatment, inequitable access to the most comprehensive trauma centers, and a lack of injury prevention programs. Although bystanders with bleeding control (BCon) knowledge and skills are vital to injury survival, only 0.5% of Idahoans have completed STOP THE BLEED®.

Purpose: Implement an evidence-based BCon course on how to identify and control life-threatening bleeding with pressure, packing, and tourniquets to increase willingness, confidence, and BCon knowledge, while decreasing concerns.

Methods: A pre-post same subject design was used. Participants were recruited through convenience sampling, with the exclusion of children ≤ 12 years of age. A 22-item survey was administered prior to, immediately after, and within four months of training. Descriptive statistics, McNemar's test, and a paired t-test were used to analyze data.

Results: After training, participants (N = 33) were more likely to help a stranger (70% vs 96.7%; p = 0.021) and render aid without a BCon kit (60% vs 86.7%; p = 0.008). Confidence improved significantly (63.3% vs 96.7%; p = 0.002). The average number of concerns decreased from 2.17 before training to 1.63 immediately after (p = 0.047) and to 1.54 within four months (p = 0.006). BCon knowledge scores improved from 74.3% on the pretest to 91.0% on posttest #1 (p < 0.001) and remained 88.3% on posttest #2 (p < 0.001).

Conclusion: STOP THE BLEED® improved willingness, confidence, and BCon knowledge, while reducing concerns.

Effectiveness of Community-Based Hemorrhage Control Education

Trauma is a leading cause of death and disability, with more Americans 1 to 44 years of age dying from violence and injures, such as homicides, motor vehicle collisions, and falls, than any other cause including diabetes, lung disease, and the flu (National Vital Statistics System, 2017). More than 240,000 people die from injury each year. At the same time, millions more survive their injuries with lifelong mental, physical, and financial problems (Kochanek et al., 2019). The risk of a poor or fatal outcome is particularly high in rural areas (Moy et al., 2017; Shiels et al., 2019). In fact, rural residents are at least 14% more likely to die from an injury than their urban counterparts due to untimely and ineffective emergency treatment in the prehospital setting, inequitable access to the most comprehensive trauma centers, and a lack of locally implemented injury prevention programs (Jarman et al., 2016, 2019; Dave et al., 2020).

Background and Significance

These disparities were apparent in Salmon—a small rural community nestled in the mountains of Central Idaho. Its agency for Emergency Medical Services (EMS) struggled with recruiting and retaining an adequate workforce to meet population needs. Without sufficient funding, the residents relied on volunteer EMS providers with lower-level skills and prolonged response times (Patterson et al., 2015). There is an 18-bed critical access hospital in town with a Level IV trauma designation (Steele Memorial Medical Center), but patients with severe injuries had to be transferred at least 160 miles away to a higher level of care. Under these circumstances, the public needed basic bleeding control (BCon) knowledge and skills. Yet only 0.5% of Idahoans had completed STOP THE BLEED®, a nationally recognized BCon course that was developed by the American College of Surgeons (ACS) to teach bystanders how to become immediate responders in a traumatic medical emergency (ACS, 2020).

Needs Assessment

During the first phase of project development, internal weaknesses and external threats to community health were assessed. In 2019, there were approximately 3,096 people living in Salmon, Idaho with a median household income of $38,634. These earnings were considerably lower than the U.S. median household income of $68,703. The poverty rate was 13.8% compared to 9.4% nationwide (U.S. Census Bureau, 2019; Semega et al., 2020). Not only were incomes too low to meet the minimum living standard, so were societal resources including primary care services, health education, and prevention programs. Based on federal criteria, the area and its population were medically underserved—a designation specifically associated with shorter life expectancy, higher rates of infant mortality, and higher death rates due to leading causes (Health Resources and Services Administration, 2020). Another vulnerability was the upward trend in trauma fatalities throughout the state. From 2000 to 2016, unintentional injury deaths increased 20% and firearm-related deaths increased 42% (Coles, 2017, 2018).

Problem Statement

The residents of Salmon, Idaho were at-risk and unprepared for a bleeding emergency. They were living in a remote location with limited financial and healthcare resources. Disparities were also noted in trauma awareness with the rise in preventable deaths due to injury and negligible participation in the STOP THE BLEED® campaign. By assessing these issues individually, we were able to identify common links that made the need for collective action at the local level obvious.

Purpose and Aims

The purpose of this quality improvement project was to implement an evidence-based BCon course in Salmon, Idaho that taught people how to identify and control life-threatening bleeding using three simple techniques: direct pressure, wound packing, and tourniquet application. Our primary outcome aims were fourfold: (1) Increase the willingness of participants to assist victims during a

traumatic medical emergency; (2) Increase the confidence of participants in their ability to help trauma victims; (3) Increase the participants' knowledge of when and how to control bleeding; and (4) Reduce the concerns of participants about assisting victims during a traumatic medical emergency.

Evidence-Based Practice Model

The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model was used to develop this DNP Project. It offered a powerful problem-solving approach to decision-making that was established by nurses from the Johns Hopkins Hospital and School of Nursing. The PET management guide consisted of three phases: (1) **P**ractice Question, (2) **E**vidence, and (3) **T**ranslation (Dang & Dearholt, 2017). Phase one involved assembling a team and defining the problem. Our team consisted of the student investigator and two advisors. We sought to determine "among members of the general public in Salmon, Idaho (P), what is the effect of hemorrhage control education (I) on their knowledge of and willingness to use BCon techniques including direct pressure, wound packing, and tourniquet application (O) compared with no intervention (C) within four months of training (T)?" After refining our practice question, internal and external sources of evidence were searched, appraised, and summarized. These steps were a vital part of phase two because they helped us determine the validity and reliability of our intervention. The literature review also gave us insight into how other researchers gathered and measured information on target variables including willingness, self-efficiency, confidence, knowledge, and skills. During the last phase, we created and implemented an action plan, evaluated our primary outcome aims, and actively disseminated project findings. Altogether these steps allowed us to rapidly incorporate the latest research findings and best practices into the care of others (Dang & Dearholt, 2017).

Literature Review

A systematic literature review provided compelling evidence on the valuable impact of BCon education. Seven randomized controlled trials (Baruch et al., 2016; Goolsby et al., 2019b; Goralnick et

al., 2018; McCarty et al., 2019; Ross et al., 2018; Tsur et al., 2019; Zwislewski et al., 2019), a nonexperimental research study (Schroll et al., 2020), and two scholarly articles with evidence-based practice guidelines (Bulger et al., 2014; Goolsby et al., 2019a) were reviewed. Each study was appraised for quality and level of evidence using the JHNEBP model (Appendix A).

When the studies were compiled, several benefits emerged. Didactic BCon education paired with applied technique significantly improved the ability of participants to recognize life-threatening bleeding and/or respond in controlled scenarios using tourniquets, wound packing, and/or hemostatic dressings (Baruch et al., 2016; Goralnick et al., 2018; Ross et al., 2018; Schroll et al., 2020; Zwislewski et al., 2019). Data were collected using feedback mechanisms (e.g., mannequins with sensors), through direct instructor observation, and/or by way of pre- and post-training questionnaires. Although most of the research studies focused on laypersons, Schroll et al. (2020) demonstrated that participants with varying degrees of formal medical training could also benefit from educational programs focused on basic BCon principles.

Significant evidence was presented in support of the primary principles of trauma care response. For example, tourniquets should be used in the prehospital setting to control extremity hemorrhage if direct pressure is ineffective or impractical. Tourniquets that have been properly applied in the prehospital setting should not be released until the patient has reached definitive care. Topical hemostatic agents in combination with direct pressure for hemorrhage control in the prehospital setting should be used in anatomic areas where tourniquets cannot be applied and where sustained direct pressure alone is ineffective or impractical. Lastly, topical hemostatic agents in gauze format should be used to support wound packing (Bulger et al., 2014; Jacobs et al., 2014).

There were several notable gaps in knowledge. When the testing environment simulated combat conditions, Tsur et al. (2019) revealed that most participants (80%) performed inadequately. Not only was tourniquet placement incorrect (62%) and prolonged (17%), but the pressure applied was not

forceful enough to stop bleeding (51%) (Tsur et al., 2019, p. 285). Goralnick et al. (2018) revealed that BCon skills decayed over time. In their study, 89% of participants were able to correctly apply a tourniquet within one hour of training compared to 55% three to nine months afterwards. McCarty et al. (2019) cautioned against only teaching principles of CAT™ tourniquet application, as it could result in participants who were unprepared to care for bleeding victims as tourniquet designs evolved. Goolsby et al. (2019b) recommended injectable sponges rather than QuikClot® for ease of use among laypersons.

Although opportunities for improvement were identified, there was sufficient evidence to support the use of basic BCon training. In the Goolsby et al. (2019b) study, participants were more capable of correctly applying a hemostatic dressing after a brief educational intervention. Ross et al. (2018) determined that STOP THE BLEED® adequately improved participants' sense of self-efficiency and willingness to act during a traumatic medical emergency. By the same token, Goralnick et al. (2018) and Zwislewski et al. (2019) demonstrated that an in-person BCon course was the most efficacious means of enabling bystanders to control life-threatening bleeding, especially when paired with hands-on practice for wound packing and tourniquet application. With all these considerations in mind, we felt confident in our decision to use teaching methods and materials from the STOP THE BLEED® program.

Methodology

This was an evidence-based quality improvement project with a pretest-posttest same subject design. The institutional review board (IRB) at the George Washington University (GW) School of Nursing determined that our project did not meet the definition of research. Thus, IRB approval was not required to proceed with implementation per GW IRB Policy HRP-010 (see Appendix B for a written statement from the GW Nursing Office of Research).

Setting

The STOP THE BLEED® course was offered in conference rooms at local venues including a volunteer fire department and an 11-bed assisted living facility. Class size was limited to 10 participants

per instructor. Appropriate cleaning supplies were provided for course participants (e.g., hand sanitizer). Equipment was sanitized before and after each class. Precautions were implemented per all governmental and organizational restrictions to prevent the spread of COVID-19 (e.g., social distancing, good hand hygiene, and face masks). There was also a strict policy in place to admit no one with cold- or flu-like symptoms.

Study Population

A convenience sampling method was used to recruit participants, with the exclusion of children 12 years of age and under. The sample size was calculated using the *A-priori Sample Size Calculator for Student t-Tests*. With the alpha level of 0.05, the anticipated effect size (Cohen's *d*) of 0.5, the desired statistical power level of 0.8, and a pre-post same subject design, 31 participants were necessary. However, this was a pilot project in a small rural community, so we adjusted our aim to 25 participants.

Subject Recruitment

Participants were recruited through a variety of methods. Course information was posted at the volunteer fire department, emailed to residents, and posted on the STOP THE BLEED® website. Easy online registration was available through SignUpGenius. Recruitment was also facilitated through word of mouth.

Consent Procedure

Course attendance was considered consent to participate. During the recruitment period, members of the community were informed that the BCon course was part of a DNP Project and the student investigator was their instructor. If they registered, a course schedule was sent via email along with written information about the project—including the student investigator's name and academic affiliation, the purpose of the project, reasons to/to not volunteer, an explanation of the intervention, potential risks and benefits, efforts to maintain anonymity, and contact information for the University's

Office of Human Research (Appendix C). The purpose of this document was to ensure participants were well-informed; no signature was required.

Ethical Considerations

There were no foreseeable risks of participation. Ethical considerations included a participant's right to respect and privacy, protection from harm, and voluntary consent. Respect and privacy were maintained through a confidential survey and by only asking questions relevant to outcome measures. Participants were strongly encouraged to make scene safety their top priority if/when attempting to help a trauma victim. This DNP Project was entirely voluntary. Participants could refuse to answer questions and stop their involvement at any time.

Subject Costs and Compensation

There were no costs or compensation for the participants. They were not asked to make any financial contributions. The BCon course was offered free of charge.

Study Intervention

The intervention was a 90-minute in-person BCon course, which included the STOP THE BLEED® Version 2.0 PowerPoint Presentation (STB v2 PPT) with embedded notes and three video demonstrations on the *ABCs of Bleeding Control*—Alert (call 911 for help), Bleeding (find the injury and assess for life-threatening bleeding), and Compress (stop the bleeding with direct pressure, wound packing, and/or tourniquet application). As a registered STOP THE BLEED® instructor (ID: 74153), the student investigator was given permission to use copyrighted course material from the ACS Committee on Trauma (Appendix D). After the lecture, participants had an opportunity to practice applying direct pressure and packing wounds with QuikClot® moulage trainers on Z-Medica Hemorrhage Control Training™ legs. They also placed blue training CAT™ tourniquets on themselves and each other under the direct supervision of the student investigator.

Outcome Measures

Participants were given a confidential survey prior to training (pretest), immediately after training (posttest #1), and within four months of training (posttest #2). The survey was developed by the student investigator from the most current literature available (Goolsby et al., 2019a, 2019b; Goralnick et al., 2018; Ross et al., 2018; Schroll et al., 2020; Zwislewski et al., 2019). The pretest and posttest #1 were administered on paper during the course, while posttest #2 was administered through REDCap (Research Electronic Data Capture)—a secure, web-based software platform hosted by the George Washington University (Harris et al., 2009, 2019).

The survey contained 22-choice items (Appendix E). There were six multiple choice questions used to collect sociodemographic characteristics. The four willingness questions and one confidence question were measured on a 5-point scale, with a higher score indicating higher willingness and confidence. The concern question had multiple choices that allowed participants to select “none” or up to six different issues. The knowledge survey included six multiple choice and four true/false questions that were acquired from the STB v2 PPT. See Appendix G for a table that summarizes how each survey item was measured.

Project Timeline

The project timeline was separated into three parts: (1) Planning and Design, (2) Data Collection and Analysis, and (3) Project Evaluation and Dissemination. The first piece transpired in *NURS 8490: DNP Project Planning.* During the Spring 2020 semester, a series of assignments were completed: Needs Assessment; Problem Statement; Purpose and Aims; Evidence Table; Methods and Variables Table; and DNP Project Proposal. An application for the *2020 STTI Phi Epsilon Chapter* grant was submitted in May 2020. Subsequently, the student investigator was awarded $500 and ordered training supplies. The second piece of the timeline was the longest. STOP THE BLEED® courses were offered in Salmon, Idaho from July to September 2020. However, data collection continued until January 2021 and data analysis

occurred shortly thereafter. The last piece of the timeline took place in *NURS 8492: DNP Project Evaluation and Dissemination.* During the Spring 2021 semester, a scholarly poster abstract, executive summary, and formal presentation were created to share findings with stakeholders at the practice sites, peers at professional and academic conferences, and faculty and staff at the University. Furthermore, this final report was archived in the Himmelfarb Library digital repository as part of a collective effort to advance nursing practice.

Resources Needed

Several resources were needed for this DNP Project. The cost of the STOP THE BLEED® training kit was $950.00. The kit included 10 instructional booklets, five blue training CAT™ tourniquets, eight QuikClot® moulage trainers, two Z-Medica Hemorrhage Control Training™ legs, and 12 pairs of protective gloves. A STOP THE BLEED® poster and additional instructional booklets (20) were $55.00. To print the pretest and posttest #1, a toner cartridge along with a ream of paper were purchased for $29.97. The statistical software needed for data analysis (SPSS Grad Pack) was $74.15. A wall-mounted STOP THE BLEED® station, with a portable bag and eight individual BCon kits, was donated to the volunteer fire department at the expense of $800.00. Additionally, there were $78.00 in shipping costs and $1.80 in taxes, which brought the grand total to $1,988.92. These expenses were offset by the *STTI Phi Epsilon Chapter* grant ($500 value). Additional funding was applied for through the Air Force Health Professions Scholarship Program.

Data Analysis, Maintenance, and Security

To match data from all three surveys, unique study codes and record numbers were created. A study code was assigned to each participant and written on the pretest, as well as posttest #1. Data were entered into REDCap and double-checked for accuracy by the student investigator. A record number for each participant was automatically generated by REDCap. Participants were required to enter their study code on posttest #2. However, the survey link was unique to each participant and

directly associated with their REDCap record number. Names and other identifying information were not on any of the survey forms. The student investigator linked the participants' name, email address, study ID, and REDCap record number in a document, which was saved on a password-protected computer that only she could access. The number of participants who attended each course was reported to the ACS; no other identifiers were disclosed.

Data were analyzed using SPSS and reported as descriptive statistics. The answers for willingness and confidence were separated into two categories: "Willing/Confident," if the participant's response was very likely/comfortable or somewhat likely/comfortable, and "Not Willing/Not Confident," if the participant's response was not sure, not likely/comfortable, or not at all likely/comfortable. McNemar's test was used to compare differences from the pretest to posttest #1, and from the pretest to posttest #2. For each concern, we reported the number and percentage of participants who selected the issue. We also created a total score for the number of concerns on each survey. McNemar's test was used to compare differences for each concern, and a paired t-test was used to compare differences for the total number of concerns. For each BCon knowledge question, we reported the total number and percentage of participants who selected the correct answer. Additionally, we created a total score for each survey and compared differences with a paired t-test.

Results

Over the duration of three months, nine STOP THE BLEED® courses were taught to 33 participants (*N* = 33), all of whom provided information about their sociodemographic characteristics (Table 1). Our sample primarily consisted of employed (45.4%), white (97.0%) females (57.6%) with a median age of 61 years (interquartile range, 18-79) and a high school or some college education (54.5%). Most of the participants reported prior first aid or medical training (67.0%), and one participant reported prior BCon training (3.0%).

Table 1

*Sociodemographic Characteristics of Participants (*N = *33)*

Characteristic		*n* (%)
Female gender		19 (57.6%)
Age, median (interquartile range)		61 (18-79)
Ethnicity, white		32 (97.0%)
Medical Experience	Prior first aid or medical training only	22 (67.0%)
	Prior first aid or medical training, and BCon training	1 (3.0%)
Occupation	Employed	15 (45.4%)
	Unemployed	2 (6.1%)
	Student	6 (18.2%)
	Retired	10 (30.3%)
Education	Non-high school graduate	5 (15.2%)
	High school/GED or some college	18 (54.5%)
	Bachelor's or more advanced degree	10 (30.3%)

The survey response and completion rates varied. All participants replied to the pretest and posttest #1 for a response rate of 100.0%, but not everyone finished the questions. The completion rates were 90.9% on the pretest and 93.9% on the posttest #1. As a result, three participants were excluded from the analysis of variables prior to and immediately after the course (n = 30). Of the remaining 30 participants, 24 replied to and finished the posttest #2. The consequence was a response and completion rate of 72.7%, as well as the exclusion of six more participants from the analysis of variables prior to and within four months of course completion (n = 24).

We summarized the results for confidence and willingness to help trauma victims in Table 2. Immediately after the course, participants reported feeling more comfortable (confident) intervening in the care of a trauma victim (63.3% vs 96.7%, p = 0.002), as well as more likely (willing) to attempt BCon on a stranger (70.0% vs 96.7%, p = 0.021) and render aid without a BCon kit (60.0% vs 86.7%, p = 0.008). In contrast to our initial findings, no statistical significance was detected for these variables from the pretest and posttest #2. Our analysis also indicated that there were no comparable differences between

the willingness of participants to help a trauma victim (80.0% vs 96.7%, $p = 0.125$) or to attempt BCon on a family member (90.0% vs 96.7%, $p = 0.625$) from the pretest to posttest #1. However, participants reported a higher percentage of willingness at baseline for these questions.

Table 2

Percentage of participants who reported willingness/confidence to help trauma victims

Survey Question	*n* (%) Pretest (*n* = 30)	*n* (%) Posttest #1 (*n* = 30)	*p* McNemar's test	*n* (%) Posttest #2* (*n* = 24)	*p* Compared to pretest
How likely are you to help a trauma victim?	24 (80.0%)	29 (96.7%)	0.125	24 (100.0%)	NA [a]
How likely are you to attempt BCon on a family member?	27 (90.0%)	29 (96.7%)	0.625	24 (100.0%)	NA [a]
How likely are you to attempt BCon on a stranger?	21 (70.0%)	29 (96.7%)	**0.021**	22 (91.7%)	0.063
How comfortable do you feel intervening in care of trauma victim?	19 (63.3%)	29 (96.7%)	**0.002**	19 (79.2%)	0.375
How likely would you be to render aid without a BCon kit?	18 (60.0%)	26 (86.7%)	**0.008**	22 (83.3%)	0.063

Note. Significant results bolded.

* *N* changed due to missing follow-up data. [a] Value not applicable due to lack of variance in follow-up.

Table 3 summarized the results for concerns. The average number of concerns on each survey decreased from 2.17 at baseline to 1.63 immediately after training ($p = 0.047$) and to 1.54 within four months of training ($p = 0.006$). For each concern, there was no statistical significance from the pretest to posttests, with one exception. Participants were less concerned about their "lack of training" immediately after course completion (56.7% vs 3.3%, $p < 0.001$) and within four months of training (56.7% vs 0.0%, p = not applicable). However, a p-value could not be calculated for this issue from the pretest to posttest #2 due to a lack of variance in follow-up data.

Table 3

Concerns about assisting trauma victims

Type of Concern	*n* (%) Pretest (*n* = 30)	*n* (%) Posttest #1 (*n* = 30)	*p* McNemar's test	*n* (%) Posttest #2* (*n* = 24)	*p* Compared to pretest
Safety/physical danger	9 (30.0%)	13 (43.3%)	0.388	8 (33.3%)	1.000
Disease transmission	12 (40.0%)	10 (33.3%)	0.625	10 (41.7%)	1.000
Sight of blood	2 (6.7%)	4 (13.3%)	0.500	3 (12.5%)	1.000
Legal responsibility	12 (40.0%)	8 (26.7%)	0.289	8 (33.3%)	0.625
Risk of causing harm	13 (43.3%)	13 (43.3%)	1.000	8 (33.3%)	1.000
Lack of training	17 (56.7%)	1 (3.3%)	**< 0.001**	0 (0.0%)	NA[a]
None	3 (10.0%)	3 (10.0%)	1.000	6 (25.0%)	0.375
Total number of concerns [b]	2.17 (1.46)	1.63 (1.13)	***t* = 2.075 *p* = 0.047**	1.54 (1.41)	***t* = 2.996 *p* = 0.006**

Note. Significant results bolded.

* *N* changed due to missing follow-up data. [a] Value not applicable due to lack of variance in follow-up.

[b] Data presented as mean (standard deviation) of total concerns unless otherwise indicated.

The results for BCon knowledge were summarized in Table 4. Although the number and percentage of correct answers were recorded for each question, statistical differences were only compared for the total scores from the pretest to posttest #1 and from the pretest to posttest #2. Overall, the survey scores improved from 74.3% at baseline to 91.0% immediately after training ($p < 0.001$) and remained 88.3% within four months of training ($p < 0.001$).

Table 4

Percentage of correct BCon knowledge answers

Survey Question	*n* (%)		
	Pretest (*n* = 30)	Posttest #1 (*n* = 30)	Posttest #2* (*n* = 24)
Scene safety is most important.	29 (96.7%)	29 (96.7%)	23 (95.8%)
What do ABCs of BCon stand for?	13 (43.3%)	28 (93.3%)	21 (87.5%)
Some examples of life-threatening bleeding include:	28 (93.3%)	28 (93.3%)	24 (100.0%)
Pressure will stop majority of bleeding.	26 (86.7%)	27 (90.0%)	21 (87.5%)
When applying direct pressure, you should?	28 (93.3%)	28 (93.3%)	23 (95.8%)
If bleeding is from a deep wound, pack gauze ___ into wound until bleeding stops; hold pressure ___.	19 (63.3%)	27 (90.0%)	24 (100.0%)
Tourniquets should be considered for ___ bleeding.	30 (100.0%)	29 (96.7%)	24 (100.0%)
When applying a tourniquet, you should place it:	25 (83.3%)	30 (100.0%)	19 (79.2%)
Continue tightening tourniquet until bleeding stops.	17 (56.7%)	29 (96.7%)	24 (100.0%)
Improvised tourniquets are easy to make and apply.	8 (26.7%)	18 (60.0%)	9 (37.5%)
Total number of correct answers [a]	7.43 (1.43)	9.10 (0.92)	8.83 (1.05)

Note. Significant results bolded. For pretest and posttest #1, t = -6.649, ***p* = < 0.001**. For pretest and posttest #2, t = -5.411, ***p* = < 0.001**.

* *N* changed due to missing follow-up data. [a] Data presented as mean (standard deviation) of total correct answers unless otherwise indicated.

Discussion

This DNP Project demonstrated the effectiveness of community-based hemorrhage control education. After completing a 90-minute STOP THE BLEED® course, participants were more willing and confident in their ability to help trauma victims, more knowledgeable about basic BCon principles, and less concerned about intervening in a bleeding emergency. Although this project had a small sample size, the results were comparable to those found in the literature. Ross et al. (2018) determined that a brief educational intervention increased participants' self-efficacy and willingness to utilize a tourniquet.

Members of the public were more comfortable intervening in an emergency following instruction, which demonstrated the importance of conducting formal educational interventions for people with little to no medical training. Schroll et al. (2020) took these findings one step further by providing evidence that STOP THE BLEED® training was just as effective at improving confidence and skill proficiency in participants with medical training as it was for participants without medical training. Furthermore, Zwislewski et al. (2019) revealed that BCon knowledge increased following a STOP THE BLEED® course with lecture and practice sessions, which was the same teaching method used for this DNP Project.

There was one unexpected finding. The effects of training on BCon knowledge and concerns were sustained at follow-up, whereas willingness and confidence began to diminish within four months. This may have been due to a lack of variance in follow-up data. As the sample size decreased from 30 to 24 participants, our ability to calculate the statistical significance of some variables was inhibited. The use of a standardized evaluation tool, as well as more time to increase course participation, would have been preferred.

This DNP Project had other limitations. Although the student investigator evaluated skill performance through direct observation, objective data was not collected. For example, a participant's inability to continue tightening the windlass rod was not a reliable indication that enough pressure had been applied to stop life-threatening bleeding. A pressure sensor could have been used to verify proper placement. Furthermore, the training scenarios did not mimic the stress and chaos of a true emergency. As a result, we were unable to anticipate the impact of emotional distress on the application of BCon knowledge and skills. When considering that Tsur et al. (2019) established a high rate of failure with tourniquet application in combat simulations, it may have been beneficial to use a device that invoked urgency (e.g., a timer) during the skills practice sessions.

Implications for Practice, Policy, Leadership, and Safety

The findings of this DNP Project provided supporting evidence for a nationwide public health campaign that began in April of 2013. After the shooting at Sandy Hook Elementary School, a concerned trauma surgeon and ACS advisor named Lenworth Jacobs, Jr. discovered through autopsy records that victims died from injuries with severe bleeding. This knowledge led to the formation of a joint committee with leaders from the medical community, federal government, and law enforcement. Their mission was to establish a national policy for enhancing the survivability of active shooter and mass casualty events. In accordance with the *Presidential Policy Directive 8,* the committee developed a series of evidence-based recommendations that were outlined in four reports known as the Hartford Consensus (Jacobs et al., 2014). More specifically, it was discovered that countless lives could be saved if bystanders were empowered, trained, and equipped to act in a traumatic medical emergency.

In October of 2015, the White House launched a national public awareness campaign called STOP THE BLEED®, with a call-to-action to begin training members of the public how to become immediate responders. This program has grown significantly due to the nation's continued experience of unexpected violence and injuries in daily life—on the highway, in the workplace, at schools, and in other public venues where people should be able to gather with an expectation of safety. Since the STOP THE BLEED® initiative began, more than 72,000 instructors and 1.4 million participants have been trained nationwide. However, a lot more work is needed to achieve their goal of training at least another 200 million more Americans (ACS, 2020).

Through this experience our team has learned that no one expects to encounter a situation with life-threatening bleeding. If they do, it is important to be prepared. Injures due to natural disasters, falls, motor vehicle collisions, violent attacks, or by any other means may result in a complicated, multifaceted emergency that requires rapid management by various responders (Jacobs et al., 2014). Regardless of when professional help arrives, bystanders are most likely to be first on the scene and

their ability to stop or slow bleeding could mean the difference between life and death. For this reason, everyone should have access to an evidence-based BCon educational program, and this can be done by raising awareness about one of the nation's largest public health campaigns—STOP THE BLEED®.

During this DNP Project, we found that people wanted to get more involved when they realized how they could help prevent injury-related deaths. For example, many participants encouraged their friends and family to attend the course. They purchased BCon kits for their homes and workplaces including housing facilities that care for the elderly and people with disabilities. Another example of inspired preparedness took place at the volunteer fire department. The fire chief mounted the STOP THE BLEED® station next to the automated external defibrillator and made the community aware of this new resource; he added BCon kits in all the emergency response bags carried by the volunteer firefighters; and he expressed strong interest in learning how to incorporate STOP THE BLEED® into the department's annual training exercises.

Plans for Sustainability

Several interventions were put in place to sustain the impact of this DNP Project. During the course, participants were given a 16-page STOP THE BLEED® instructional booklet to take home for future reference. The booklet reinforced the course by illustrating the primary principles of trauma care response. In addition to the wall-mounted STOP THE BLEED® station with individual BCon kits, a STOP THE BLEED® poster was donated to the volunteer fire department. The 24-inch by 36-inch poster was hung near the station to conveniently display step-by-step BCon instructions.

Next, a Google Classroom (class code: n2l2ftk) was built for the BCon course with six sections of learning material. Section one gave participants an overview of the course and the option to complete the pretest. Section two displayed a digital story about the STOP THE BLEED® campaign, as well as a video with a powerful reminder that bleeding emergencies happen at a moment's notice. Section three contained a STB v2 multimedia presentation and a video about how to improve the survivability of a

bleeding emergency. Optional resources were uploaded into section four—including the STOP THE BLEED® instructional booklet, the Save-A-Life flowchart, the STOP THE BLEED® poster, a video demonstration of tourniquet application, a list of approved BCon devices, and the Hartford Consensus Compendium. Section five was equipped with learning activities—including a branching scenario for BCon knowledge application and the posttest with answers and rationales. Section six summarized the lesson and offered closing thoughts.

Lastly, actions were taken to establish a sustainable BCon program in Salmon. The student investigator applied for a *STOP THE BLEED® Training Kit Grant* ($1,000 value). Winners will be announced on May 20, 2021 in celebration of STOP THE BLEED® Day. These supplies, along with the lessons learned from this DNP Project, will be used to identify as well as train new BCon course instructors. Additionally, the student investigator will lobby stakeholders to continue the STOP THE BLEED® program through the volunteer fire department.

Future Scholarship

Future initiatives should focus on supporting and maintaining education through STOP THE BLEED®. The program could be expanded for wider distribution by including a blended learning option much like the Basic Life Support course offered by the American Heart Association. This training method combines eLearning activities (e.g., online lectures, exams, and simulations) with in-person sessions for skill validation. However, a standardized evaluation tool that accurately and reliably assesses learning and knowledge retention would have to be developed. With evidence of skill decay (Goralnick et al., 2018), more research is also needed to determine the frequency of recertification.

Conclusion

This DNP Project provided quantitative evidence that the willingness, confidence, and knowledge of participants, as they relate to the primary principles of trauma care response, increased after completing a 90-minute STOP THE BLEED® course with didactic instruction followed by applied

technique. It also revealed that training decreased participants' concerns about assisting victims during a traumatic medical emergency. In this way, community-based hemorrhage control education was an effective intervention that should continue to be utilized by healthcare professionals for the purpose of promoting and improving public health.

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Appendix A. *Table of Evidence*

Article #	Author and Date	Evidence Type	Sample, Sample Size, Setting	Findings That Help Answer EBP Question	Observable Measures	Limitations	Evidence Level, Quality
1	Baruch et al., 2016	RCT	Participants were male Israeli recruits of single infantry brigades enlisted in active military duty who had no previous medical training Out of 349 available recruits, 42 were excluded for not qualifying as "Life Savers" Dropout included 108 recruits who were not available during initial assessment due to other training events and 43 recruits who were not available during final assessment Sample size was reduced to 156 recruits with N = 87 in triple-application practice (TAP) group and N = 69 in single-application practice (SAP) group Study conducted on a field under real combat training condition	Initially, TAP and SAP group performed similarly Both groups improved from initial to final assessment TAP group improved more than SAP group in mean application time (faster by 18 vs. 8 seconds, respectively; *P* = .023) and in reducing proportion of participants who were unable to apply any pressure to mannequin (less by 18% vs. 8%, respectively; *P* = .009)	Tourniquet application time and pressure (defined as time from beginning of assessment until applied pressure reached 200 mmHg and mannequin sensed thigh was no longer losing blood)	High dropout rate of almost 50% due to mandatory training requirements; occurrence anticipated and addressed by initially doubling sample size Selected study duration was only 3 months Allocation to study groups was based on platoons rather than individuals	JADAD score 3 (not double blinded) High quality rating Level of Evidence: I
2	Bulger et al., 2014	Systematically developed recommendations based on research evidence from ACS Committee on Trauma for external hemorrhage control in prehospital setting Expert panel: U.S. military TCCC, Prehospital Trauma Life Support, EMS researcher, EMS	Systematic review of literature was conducted by ECRI Institute Full review identified 23 clinical studies (16 studies of tourniquets and 7 studies of hemostatic dressings) that met inclusion criteria and 39 animal model studies that compared efficacy of topical hemostatic agents	Strong recommendation based on moderate quality of evidence for use of tourniquets in prehospital setting for control of significant extremity hemorrhage if direct pressure is ineffective or impractical Weak recommendation based on low quality of evidence for using commercially produced windlass, pneumatic, or	Population of interest was individuals with extremity hemorrhages Interventions were commercially available tourniquets and hemostatic dressings Comparators were external wound pressure and non-tourniquet or non-hemostatic interventions	Insufficient data to recommend devices for junctional hemorrhage control and application in pediatric and elderly patients	**Quality of evidence ratings are in each recommendation* Level of Evidence: IV

		directors, surgeons, emergency MDs, paramedic, GRADE methodologist		ratcheting devices that have been demonstrated to occlude arterial flow Weak recommendation based on low quality of evidence for application of improvised tourniquets only if no commercial device is available Weak recommendation based on low quality of evidence against releasing a tourniquet that has been properly applied in prehospital setting until patient has reached definitive care Weak recommendation based on low quality of evidence for use of topical hemostatic agents, in combination with direct pressure, for control of significant hemorrhage in prehospital setting in anatomic areas where tourniquets cannot be applied and where sustained direct pressure alone is ineffective or impractical Weak recommendation based on low quality of evidence for delivering topical hemostatic agents in gauze format to support wound packing	Outcomes of interest were limb salvage, hypovolemic shock, survival, and adverse effects		

3	Goolsby et al., 2019a	Systematically developed recommendation based on research evidence Peer Reviewed Journal	Recommendation based on review of databases (i.e., Gun Violence Archive, Mother Jones database, FBI database, Counter Extremism Project database, Global Terrorism Database, TSA database), gray literature, scholarly publications from PubMed, and U.S. government reports to capture information about mass casualty attacks including number of fatalities, number of people injured, location, and type of violence	Based on typical number and severity of victims during intentional mass casualty events, planners should equip public sites with bleeding-control supplies to treat a minimum of 20 people	Typical, or mean, number of anticipated bleeding victims during an intentional mass casualty event to consider when determining quantity of bleeding control supplies needed to equip public venues	Mass casualty attacks (e.g., suicide bombers, shooters) are unpredictable and indiscriminate; stocking bleeding-control supplies for 20 victims may not be adequate for a future event Lack of data about injuries during mass casualty attacks made it difficult to determine most cost-effective way to prepare for response to future events	High quality rating Level of Evidence: IV
4	Goolsby et al., 2019b	RCT	N = 360 laypersons 18 to 70 years of age without prior medical or hemostatic dressing training were recruited at a Fitness Expo in Maryland and at pedestrian mall in Virginia Participants were randomized into either a control group using a plain 4x4 gauze dressing (n = 93) or 1 of 3 experimental groups: (1) Z-folded gauze arm consisting of QuikClot z-folded gauze moulage trainer (n = 86), (2) S-rolled gauze arm consisting of a plain rolled gauze thickened with a corn starch mixture to a consistency like Celox Gauze (n = 91), or (3) XStat-12 syringe filled with mini sponges (n = 90)	202 participants (56%) applied dressings correctly; 83 (92%) applied injectable sponges correctly 38 participants (40%) correctly applied plain gauze, while 37 (43%) and 44 (48%) participants correctly applied z-folded and s-rolled gauzes; primary reasons for failure was not holding pressure long enough (n = 103, 65%) and not applying adequate pressure (n = 64, 41%) Participants in all arms had significant improvements in willingness to use hemostatic dressings: 154 (43.6%) participants pre vs. 344 (97.5%) post study participation ($P < 0.001$)	Participants watched a standardized 3- to 4-minute video, practiced hands-on dressing application, and were assessed applying dressings via checklists and feedback mechanisms for pressure (≥ 250 mmHg or set-point of 5 PSI), timing (< 3 minutes), and packing Participants completed pre- and post-training questionnaires regarding willingness to use hemostatic dressings	Study occurred in static environment without bleeding, pain, and fear associated with actual injury, which could impact willingness and skill performance Optimal pressure and time to generate hemostasis was unknown Cost, size, and portability of supplies were not considered Skill retention and effectiveness of different education modalities were not evaluated	Good quality rating (reasonably consistent recommendations) Level of Evidence: II (RCT with significant difference; negative criterion for observer blinding)

5	Goralnick et al., 2018	RCT	Out of 562 participants, 97 reported prior hemorrhage control training and were excluded N = 465 laypersons, all of which were stadium employees from security, parking, food/beverage, and operations Divided into 4 different training groups based on type of instruction: flashcards (n = 117), audio kits (n = 122), in-person bleeding control (B-Con; n = 122), and control (n = 104) 189 (40.7%) participants were women with a mean age of 46.3 years Study conducted using simulated scenarios within a professional sports stadium in Massachusetts with capacity for 66,000 people	For correct tourniquet application, B-Con (88%; *P* < .001) was superior to control (16%) while instructional flashcards (19.6%) and audio kits (23%) were not > 50% of participants in flashcard and audio kit groups did not use educational prompts as intended Of 303 participants (65%) who were assessed 3 to 9 months after undergoing B-Con training, 165 (54.5%) could correctly apply a tourniquet There was no further skill decay in adjusted model that treated time as either linear (odds ratio, 0.98; 95% CI, 0.95-1.03) or quadratic (odds ratio, 1.00; 95% CI, 1.00-1.00) Adults aged 18 to 35 years (n = 58; odds ratio, 2.39; 95% CI, 1.21-4.72) and aged 35 to 55 years (n = 107; odds ratio, 1.77; 95% CI, 1.04-3.02) were more likely to be efficacious than those 55+ years (n = 138)	Correct tourniquet application was defined as placement ≥ 2 inches proximal to injury with adequate tightness in < 7 minutes	Single site study Did not address laypersons' understanding of when to apply other hemorrhage control techniques beyond tourniquets Training scenarios did not mimic stress and chaos of a true emergency Evaluators where not blinded 35% of original sample was lost to follow-up, which has potential to create selection bias	JADAD score 3 (not double blinded) High quality rating Level of Evidence: I
6	McCarty et al., 2019	RCT	Volunteer sample of laypeople who attended a B-Con course at Gillette Stadium and Longwood Medical Area in Boston, Massachusetts N = 102 participants (50 [49.0%] male; median age 37.5 [27-53] years)	Participants correctly applied CAT at a significantly higher rate (92.2%) than all other commercial tourniquet types (Special Operation Forces Tactical Tourniquet, 68.6%; Stretch-Wrap-and-Tuck Tourniquet, 11.8%; Rapid Application	Correct tourniquet application (applied pressure ≥ 250 mmHg within 2-minute time cap) in a simulated scenario for 3 commercial tourniquets (Special Operation Forces Tactical Tourniquet, Stretch-Wrap-and-Tuck Tourniquet, and Rapid	Results should not be interpreted to mean that other tourniquets are less effective than CAT Participants were tested in sequence on each tourniquet type, which could	JADAD score 3 (not double blinded) High quality rating Level of Evidence: I

			No losses or study exclusions Participants had higher educational levels than national figures, with 67 (65.7%) having a bachelor or more advanced degree 34.3% self- reported prior first-aid training; 24.5% reported prior first aid plus hemorrhage-control training; median time since prior hemorrhage-control training was 6.5 years (2.0-20.0 years); 18.6% reported having prior training in how to use a tourniquet	Tourniquet System, 11.8%) and improvised tourniquet, 32.4% (*P* < .001) When comparing tourniquets applied correctly, all tourniquet types had higher estimated blood loss, had longer application time, and applied less pressure than CAT	Application Tourniquet System) Improvised tourniquet compared with correct CAT application as an internal control using 4-pairwise Bonferroni-corrected comparisons with McNemar test	have resulted in incremental learning Unable to predict how a layperson would act if presented with a bleeding person in real life Testing volunteers may have caused selection bias Unable to assess validity of demographics	
7	Ross et al., 2018	RCT	Participants recruited through University of Texas student interest groups, Southwest Regional Trauma Advisory Council community education committee, and personal connections within San Antonio community Of 236 participants, 218 met eligibility criteria (individuals without medical training and > 18 years of age) Participants were 68.1% female, 44.5% Hispanic, 29.8% under age 21, 42.5% reported earning < $25,000 per year, most reported having some college education Study was conducted at community health fair, schools, community group meetings, San Antonio Airport during public safety training sessions for personnel, and during rehearsal sessions for local musician group	When initially asked if they would use a tourniquet in real life, 64.2% (140/218) responded "Yes" Following training, 95.6% (194/203) of participants responded that they would use a tourniquet in real life When participants were asked about their comfort level with using a tourniquet in real life, there was a statistically significant improvement between their initial and post training responses (2.5 vs. 4.0, based on 5-point Likert scale; *P* < .001)	Knowledge of and willingness to use a tourniquet in response to a traumatic medical emergency were self-reported by participants in pre-/post- intervention questionnaires	Difference types of tourniquets, extremities, and mannequins were used in each group Results may inadequately represent general population due to convenience sampling method	JADAD score 3 (not double blinded) High quality rating Level of Evidence: I

8	Schroll et al., 2020	Nonexperimental Research Study	N = 1974 participants (lay and medical rescuers) were recruited using institution-wide email from U.S. medical schools, outreach to physicians and residents at participating institutions, and printed materials distributed within community Lay rescuers (LRs) included individuals with no medical training (pre-course n = 524, post-course n = 854) Medical rescuers (MRs) included attending physicians, residents, medical students, nurses, nursing students, and emergency medical personnel (pre-course n = 1120, post-course n = 1004)	Pre-course confidence was lowest for both groups in management of active severe bleeding and ability to pack a bleeding wound Post-course confidence improved significantly for both groups in all 6 core areas measured ($P < 0.001$) Most significant increases were reported in areas of lowest pre-course confidence: • Management of active severe bleeding (LR 2.0 [SD 1.2] vs. 4.2 [SD 0.9] and MR 2.6 [SD 1.4] vs. 4.6 [SD 0.6], $P < 0.001$) • Ability to pack a bleeding wound (LR 2.1 [SD 1.3] vs. 4.4 [SD 0.8] and MR 2.7 [SD 1.3] vs. 4.7 [SD 0.05], $P < 0.001$) Objective assessment of LR skills at end of course demonstrated combined 99.3% proficiency on post-course objective assessments Study provides quantitative evidence that B-Con training is effective with lay and medical rescuers	Participants were given an anonymous 5-point Likert scale survey prior to and after B-Con training to self-report knowledge and confidence in 6 major areas: 1. Recognition of life-threatening hemorrhage 2. Proper application of a tourniquet 3. Holding pressure on an actively bleeding would 4. Packing of a deep open wound 5. Management of active severe bleeding during a mass casualty event 6. Confidence to teach techniques learned	Pre- and post-course surveys were not obtained from all participants Investigators were unable to link objective skills to level of medical training B-Con knowledge and skill retention was not assessed	High quality rating Level of Evidence: III

9	Tsur et al., 2019	RCT	Participants were male Israeli recruits 18-20 years of age of single infantry brigades enlisted in active military duty who had no previous medical training Out of 305 participants, 138 were assigned to a control group and 167 were assigned to a combat stress inoculation (CSI) group Study was conducted in isolated classrooms with simulators	Overall failure rate was 80.33% (81.90% in control group vs. 79.00% in CSI group; *P* = .565; 95% CI, 0.677 to 2.122) Differences in pressure, time to stop bleeding, or placement were not significant (95% CI, −17.283 to 23.404, −1.792 to 6.105, and 0.932 to 2.387, respectively) Tourniquet placement was incorrect in 62.3% of applications	Educational intervention included Combat Lifesaver training followed by 12 tourniquet applications on peer or self with immediate supervision and instructor feedback Correct tourniquet application measured by simulator and defined as applied pressure ≥ 200 mmHg, time to stop bleeding ≤ 60 seconds, and placement 7.5 cm above amputation	Neither participants, instructors, nor assessors were blinded Allocation to study groups was based on platoons rather than individuals	JADAD score 3 (not double blinded) High quality data collected Level of Evidence: I
10	Zwislewski et al., 2019	RCT	Pennsylvania Department of Transportation hosted an OSHA workshop for employees and offered *Stop the Bleed* courses at each session 5 classes were held in a warehouse at different locations throughout Philadelphia N = 298 (observed as largely male)	Experimental group scored higher on B-Con knowledge-based post-test (M = 4.63, SD = 1.32) than on pre-test (M = 3.21, SD = 1.14) Experimental group (M = 2.93, SD = .26) scored significantly higher than control group (M = 1.97, SD = .77) that attempted wound packing without any hands-on training Experimental group scored significantly higher (M = 7.41, SD = .91) than control group (M = 5.99, SD = 1.81) for tourniquet application	B-Con knowledge was self-reported by participants in pre-/post-intervention questionnaires Cognitive and psychomotor ability related to tourniquet application and wound packing was measured on a binary scale by volunteer instructors using itemized checklists	Demographic data not captured Not all employees participated in hands-on training or completed post-test, which could lead to selection bias Open setting allowed groups to witness action and feedback given to others before they were evaluated External validity influenced by variability in evaluators; potential for bias existed with lack of formal inter-rater reliability testing	JADAD score 3 (not double blinded) High quality data collected Level of Evidence: I

Appendix B. *Human Subject Research Determination*

Dear Kristin and Dr. Zhou,

Regarding the determination request for the proposal entitled, “Effectiveness of Community- Based Hemorrhage Control Education," a determination has been made that your project does not meet the definition of research. That is, a systematic investigation intended to contribute to generalizable knowledge.

This determination is being made after review of the project documents. The project nature as quality improvement intends to inform internal practice. The project does not aim to inform new theories or external standards of practice. Therefore, further review by the GW Nursing Office of Research or the GW Institutional Review Board is not required (per GW IRB Policy HRP-010, Human Research Protection Program).

Should your project change in any way that it would meet the definition of research, please contact the GW Nursing Office of Research at sonresearch@gwu.edu so we may assist you in proceeding. As a reminder, you are to conduct all projects in an ethical manner regardless of review requirements.
Please do not hesitate to contact me with any questions or concerns regarding this determination.

Kind regards,

Angela M. McNelis, PhD, RN, FAAN, ANEF, CNE
Professor and Associate Dean for Scholarship, Innovation, and Clinical Science Governor-At-Large, National League for Nursing
George Washington University School of Nursing
1919 Pennsylvania Ave, NW Suite 500
Washington, D.C. 20006Office: 202-994-2066
Email: angelamcnelis@gwu.edu

Appendix C. *DNP Project Information for Participants*

Title of Study: Effectiveness Community-Based Hemorrhage Control Education
Principal Investigator Name: Kristin Conti, MSN, APRN, FNP-C, RN, CCRN

You are invited to participate in a DNP project under the direction of Kristin Conti from the Department of Nursing, George Washington University. Taking part in this project is entirely voluntary.

The purpose of this DNP project is to evaluate the effect of bleeding control education on your knowledge of and willingness to use lifesaving techniques in response to a traumatic medical emergency.

What are the reasons you might choose to volunteer for this DNP project?

According to the American College of Surgeons, the leading cause of preventable death after injury is bleeding. Participating in this project will teach you how to recognize life-threatening bleeding along with the steps to stop the bleeding with pressure, packing, and tourniquets.

What are the reasons you might not choose to volunteer for this DNP project?

The course content can be stressful and intimidating. However, the curriculum is specifically designed for participants who do not have any formal medical training. Although graphic clinical photos have been excluded from the course, bleeding emergencies can be disturbing, and immediate responders may be exposed to a lot of blood.

If you choose to take part in this DNP project, you will have the opportunity to attend a 2- hour bleeding control course that includes a 50-minute lecture followed by skills stations for practicing wound packing and tourniquet application. You will be asked to complete a survey on three separate occasions: prior to training, immediately after the course is complete, and within four months of training. The survey will take approximately 10 minutes to complete. The total amount of time you will spend in connection with this project is two hours in class and ten minutes online. You may refuse to answer any of the questions, and you may stop your participation at any time.

Possible risks or discomforts you could experience during this DNP project include loss of confidentiality or psychological stress.

You will not benefit directly from your participation in the DNP project. The benefits to science and humankind that might result are fewer trauma fatalities.

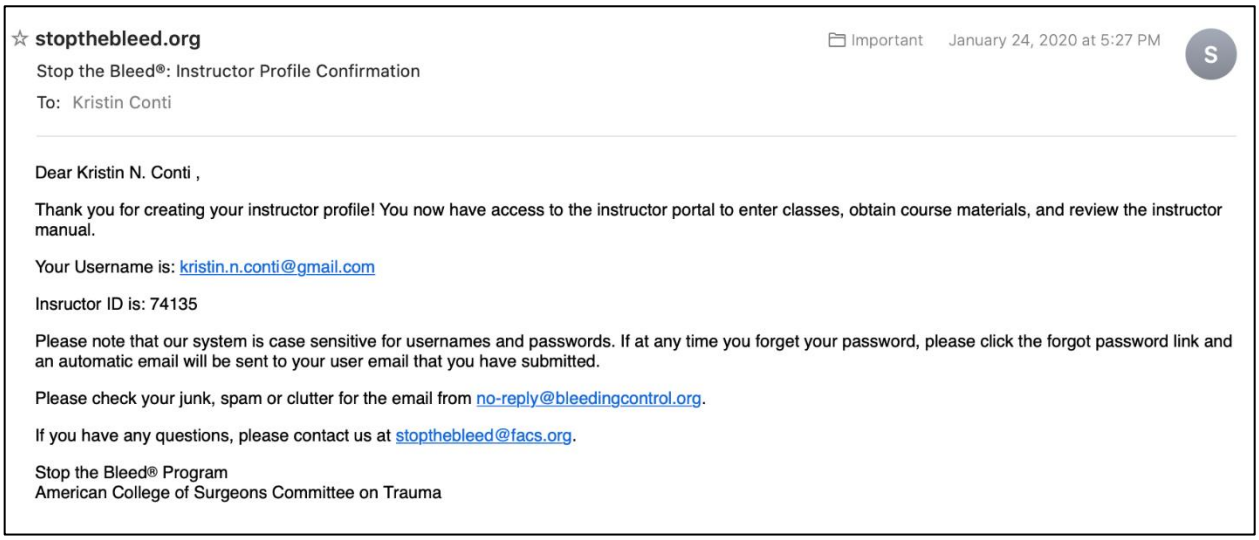
Every effort will be made to keep your information confidential; however, this cannot be guaranteed. ONLY the number of course participants will be reported to the American College of Surgeons at stopthebleed.org. The survey you will be asked to take is completely confidential and the data will be managed on a secure web platform. If results of this DNP project are reported in journals or at scientific meetings, the people who participated will not be named or identified.

The Office of Human Research of George Washington University, at telephone number (202) 994-2715, can provide further information about your rights as a participant.

To ensure anonymity your signature is not required.

Your willingness to participate in this DNP project is implied if you proceed. Please keep a copy of this document in case you want to read it again.

Appendix D. *STOP THE BLEED® Instructor Profile*



☆ **stopthebleed.org** Important January 24, 2020 at 5:27 PM S

Stop the Bleed®: Instructor Profile Confirmation

To: Kristin Conti

Dear Kristin N. Conti ,

Thank you for creating your instructor profile! You now have access to the instructor portal to enter classes, obtain course materials, and review the instructor manual.

Your Username is: kristin.n.conti@gmail.com

Insructor ID is: 74135

Please note that our system is case sensitive for usernames and passwords. If at any time you forget your password, please click the forgot password link and an automatic email will be sent to your user email that you have submitted.

Please check your junk, spam or clutter for the email from no-reply@bleedingcontrol.org.

If you have any questions, please contact us at stopthebleed@facs.org.

Stop the Bleed® Program
American College of Surgeons Committee on Trauma

Appendix E. *Survey*

Thank you for taking the STOP THE BLEED® course. Data from the following survey will be used to understand how this program affects participants. Please **answer every question** to the best of your ability.

1. What is the sex of the individual taking this survey?

   - ○ Male
   - ○ Female
   - ○ Not reported

2. What is the age of the individual taking this survey?

   - ○ 18 years or less
   - ○ 19-39 years
   - ○ 40-59 years
   - ○ 60-79 years
   - ○ 80 years or greater

3. What is the ethnicity of the individual taking this survey?

   - ○ American Indian or Alaska Native
   - ○ Asian
   - ○ Black or African American
   - ○ Hispanic or Latino
   - ○ Native Hawaiian or Pacific Islander
   - ○ White
   - ○ Not reported

4. What is the first aid/medical experience of the individual taking this survey? Select all that apply.

   - ☐ No previous medical training
   - ☐ Basic first aid/CPR certified
   - ☐ ATCN certified
   - ☐ TNCC certified
   - ☐ Bleeding control training
   - ☐ Military medical training
   - ☐ Emergency medical services (EMS)
   - ☐ Clinical/hospital training

5. What is the current occupation of the individual taking this survey?

   - ○ Agriculture, Food, Natural Resources
   - ○ Arts, Audio/Video Technology, Communication
   - ○ Education and Training
   - ○ Government and Public Administration
   - ○ Military
   - ○ Hospitality and Tourism
   - ○ Information Technology
   - ○ Manufacturing
   - ○ Science, Technology, Engineering, Mathematics
   - ○ Architecture and Construction
   - ○ Business Management and Administration
   - ○ Finance
   - ○ Health Science and Medical
   - ○ Human Services
   - ○ Law, Public Safety, Corrections, Security
   - ○ Marketing and Sales
   - ○ Transportation, Distribution, Logistics
   - ○ Unemployed
   - ○ Student
   - ○ Retired

6. What is the highest level of education completed by the individual taking this survey?

   - ○ Non-high school graduate
   - ○ High school/GED
   - ○ Associate degree
   - ○ Bachelor's degree
   - ○ Master's degree
   - ○ Doctorate degree

7. How likely are you to help a trauma victim, if presented with a medical emergency?

   - ○ Not at all likely
   - ○ Not likely
   - ○ Not sure
   - ○ Somewhat likely
   - ○ Very likely

8. How likely are you to attempt bleeding control on a member of your family, if presented with a traumatic medical emergency?

   - ○ Not at all likely
   - ○ Not likely
   - ○ Not sure
   - ○ Somewhat likely
   - ○ Very likely

9. How likely are you to attempt bleeding control on a stranger, if presented with a traumatic medical emergency?

   - ○ Not at all likely
   - ○ Not likely
   - ○ Not sure
   - ○ Somewhat likely
   - ○ Very likely

10. How comfortable do you feel intervening in the care of a trauma victim, if presented with a medical emergency?

    - ○ Not at all comfortable
    - ○ Not comfortable
    - ○ Not sure
    - ○ Somewhat comfortable
    - ○ Very comfortable

11. How likely would you be to render aid, if you did not have a bleeding control kit available?

    - ○ Not at all likely
    - ○ Not likely
    - ○ Not sure
    - ○ Somewhat likely
    - ○ Very likely

12. Do you have any concerns about rending aid to a bleeding survivor? Select all that apply.

- ☐ Safety/physical danger
- ☐ Disease transmission
- ☐ Sight of blood
- ☐ Legal responsibility/consequences
- ☐ Risk of causing further injury/harm
- ☐ Lack of training
- ☐ None

13. Scene safety is most important.

- ○ True
- ○ False

Answer: True. Your personal safety is top priority. If you become injured, you will not be able to help anyone. Help others only when it is safe. If the situation changes or becomes unsafe: stop; move to safety; and take the victim with you, if possible. Once you reach safety, you can resume bleeding control (ACS, 2019, slide 7).

14. When analyzing the ABCs of Bleeding Control, what does the acronym stand for?

- ○ Alert (call 9-1-1), Bleeding (find the source of bleeding), Compress (pressure, packing, tourniquet)
- ○ Airway (assess level of consciousness), Breathing (check for respiratory distress), Circulation (start compressions if carotid pulse is absent)
- ○ Alert (call 9-1-1), Breathing (check for respiratory distress), Compress (pressure, packing, tourniquet)
- ○ Airway (assess level of consciousness), Bleeding (find the source of bleeding), Circulation (start compressions if carotid pulse is absent)

Answer: The ABCs of Bleeding Control are "**A**lert" (call 9-1-1), "**B**leeding" (find the source of bleeding), and "**C**ompress" (pressure, packing, tourniquet) (ACS, 2019, slide 9).

15. Some examples of life-threatening bleeding include:

- ○ Blood that is spurting out of the wound
- ○ Blood that won't stop coming out of the wound
- ○ Blood that is pooling on the ground
- ○ Bleeding in a victim who is now confused or unconscious
- ○ All the above

Answer: "All the above" are examples require immediate attention. Other examples of life-threatening bleeding include clothing or bandages soaked in blood or loss of all or part of a limb (ACS, 2019, slide 13).

16. Pressure will stop most bleeding.

- ○ True
- ○ False

Answer: True (ACS, 2019, slide 17)

17. When applying direct pressure, you should do which of the following?

- ○ Apply pressure indirectly to the bleeding site
- ○ Use as much gauze or cloth as possible to cover the injury
- ○ Only hold pressure for 3-5 minutes so you don't cut off circulation
- ○ Apply enough force to stop the bleeding and continue applying pressure until help arrives

Answer: Start with *direct* pressure. Use just enough gauze to cover the wound; excessive amounts make pressure ineffective. If gauze is unavailable, use any clean material. *Apply enough force to stop the bleeding and continue applying pressure until help arrives* (ACS, 2019, slide 17).

18. If bleeding is from a deep wound, pack gauze _____ into the wound until it stops the bleeding; hold pressure _____.

    - ○ Tightly, for 3-5 minutes
    - ○ Loosely, until help arrives
    - ○ Tightly, until help arrives
    - ○ Loosely, for 3-5 minutes

    Answer: Tightly, until help arrives. If bleeding is from a cavity, superficial pressure may not work. You will need to pack the wound deeply and tightly. Be careful as there may be sharp objects or fragments of bone within the cavity. Once the bleeding stops, do not check the wound, simply hold pressure until help arrives (ACS, 2019, slide 19).

19. Tourniquets should be considered for _____ bleeding that does not stop with pressure or packing, or if the situation does not allow you to maintain pressure on the wound.

    - ○ Extremity (arms and legs)
    - ○ Junctional (neck, armpits, and groin)
    - ○ Torso/trunk (chest, back, and abdomen)

    Answer: Extremity (arms and legs). Tourniquets should NEVER be considered for the neck, armpits, groin, or body (ACS, 2019, slide 22).

20. When applying a tourniquet, you should place it:

    - ○ Over the nearest joint
    - ○ As close to the wound as possible
    - ○ Where the patient says it is most comfortable
    - ○ At least 2 to 3 inches above the bleeding site

    Answer: Apply the tourniquet at least 2 to 3 inches above the bleeding site. DO NOT place the tourniquet over a joint or bony prominence. Place it above the joint, if necessary (ACS, 2019, slide 23).

21. Continue tightening the tourniquet until bleeding stops.

    - ○ True
    - ○ False

    Answer: True. Two tourniquets may be required to achieve bleeding control. It is a painful procedure. Severe pain should be expected. Do not remove the tourniquet (ACS, 2019, slide 23).

22. Improvised tourniquets are easy to make and apply correctly (i.e., tourniquets created spontaneously using whatever material is available).

    - ○ True
    - ○ False

    Answer: False. Improvised tourniquets are *difficult* to make and apply correctly. They may increase bleeding by compressing venous structures. Their utility is not scientifically proven. Caution should be used when considering their use (ACS, 2019, slide 25).

Appendix F. *Table of Outcome Measures*

Survey Questions	Measures	Measure Type	Data Source	Population	Frequency	Calculation Statistics	Goal
How likely are you to help a trauma victim, if presented with a medical emergency?	Willingness	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Mean score ≥ 4 (5-point scale)
How likely are you to attempt BCon on a family member, if presented with a traumatic medical emergency?	Willingness	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Mean score ≥ 4 (5-point scale)
How likely are you to attempt BCon on a stranger, if presented with a traumatic medical emergency?	Willingness	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Mean score ≥ 4 (5-point scale)
How comfortable do you feel intervening in care of a trauma victim, if presented with a medical emergency?	Confidence	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Mean score ≥ 4 (5-point scale)
How likely would you be to render aid, if you did not have a BCon kit available?	Willingness	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Mean score ≥ 4 (5-point scale)
Do you have any concerns about rending aid to a bleeding survivor?	Concern	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Mean score	Post < pre
Scene safety is most important.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
When analyzing the ABCs of BCon, what does the acronym stand for?	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
Some examples of life-threatening bleeding include:	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%

Pressure will stop majority of bleeding.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
When applying direct pressure, you should?	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
If bleeding is from a deep wound, pack gauze ___ into wound until it stops bleeding; hold pressure ___.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
Tourniquets should be considered for ___ bleeding that does not stop with pressure or packing, or if situation does not allow you to maintain pressure on wound.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
When applying a tourniquet, you should place it:	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
Continue tightening tourniquet until bleeding stops.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%
Improvised tourniquets are easy to make and apply correctly.	BCon Knowledge	Outcome	Survey	Anyone ≥ 13 years of age	Prior to, immediately after, within 4 months of training	Percentage	100%